

IN THE CLAIMS

1-61. (canceled)

62. (original) An MPEG on-screen display coder comprising:

a buffer arranged to receive and buffer an MPEG transport data stream containing frames of a selected program and frames of a non-selected program;

an MPEG encoder arranged to encode frames of the selected program with an on-screen display; and,

a multiplexer arranged to selectively pass to a digital television receiver the frames of the non-selected program, the encoded frames of the selected program, and original frames of the selected program.

63. (original) The MPEG on-screen display coder of claim 62 wherein the encoded frames have a time base which is independent of the original frames of the selected program.

64. (original) The MPEG on-screen display coder of claim 62 wherein the encoded frames have a time base which is slaved to the original frames of the selected program.

65. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to calculate a video hold off time dependent upon a number of frames in a decoder buffer of the digital television receiver and to use the video hold off time so as to prevent overflow of the decoder buffer.

66. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to supply I frame markers, and wherein the multiplexer is controlled in response to the I frame markers so as to begin supplying encoded frames to the digital television receiver with one I frame and to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

67. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to supply a video I frame marker and an on-screen display I frame marker, wherein the multiplexer is controlled in response to the on-screen display I frame marker so as to begin supplying encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is

controlled in response to the video I frame marker so as to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

68. (original) The MPEG on-screen display coder of claim 67 wherein the MPEG encoder supplies the on-screen display I frame marker when the MPEG encoder generates an encoded I frame, and wherein the MPEG encoder signals the video I frame marker when an original I frame of the selected program is received.

69. (original) The MPEG on-screen display coder of claim 62 wherein the on-screen display is overlaid on a solid color background.

70. (original) The MPEG on-screen display coder of claim 62 wherein the on-screen display is overlaid on video.

71. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to pass unchanged I frames.

72. (original) The MPEG on-screen display coder of claim 71 wherein the MPEG encoder is arranged to encode a first P frame by predicting the first P frame from a preceding I frame with residuals in the predicted first P frame containing the on-screen display and with motion vectors set equal to zero, and wherein the MPEG encoder is arranged to encode subsequent P frames based upon the predicted first P frame with residuals and motion vectors set equal to zero.

73. (original) The MPEG on-screen display coder of claim 72 wherein the MPEG encoder is arranged to supply first and second I frame markers, wherein the multiplexer is controlled in response to the first I frame marker so as to begin supplying the encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is controlled in response to the second I frame marker so as to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

74. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to encode I frames with the on-screen display.

75. (original) The MPEG on-screen display coder of claim 74 wherein the MPEG encoder is arranged to encode subsequent P frames by prediction based upon the encoded I frames with residuals and motion vectors set equal to zero.

76. (original) The MPEG on-screen display coder of claim 75 wherein the MPEG encoder is arranged to supply first and second I frame markers, wherein the multiplexer is controlled in response to the first I frame marker so as to begin supplying the encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is controlled in response to the second I frame marker so as to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

77. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to generate an I frame having a solid color background and an on-screen display, and wherein the MPEG encoder generates a P frame predicted from the I frame with zero residual.

78. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to encode frames with the on-screen display by prediction with non-zero motion vectors in order to encode animated graphics.

79. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to pass a first I frame without modification, to predict subsequent P frames based upon the first I frame, to overlay the on-screen display on a second I frame, and to predict subsequent P frames based upon the second I frame.

80. (original) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to encode frames by mixing original video of the selected program in a window of reduced size with the on-screen display.

81. (original) The MPEG on-screen display coder of claim 62 wherein the multiplexer is arranged to add make-up packets to each encoded frame as necessary to

ensure that each encoded frame has as many transport packets as an original frame of the selected program.

82. (original) The MPEG on-screen display coder of claim 81 wherein the make-up packets are null packets.

83. (original) The MPEG on-screen display coder of claim 81 wherein the make-up packets are Program Map Table packets.

84. (previously presented) The MPEG on-screen display coder of claim 62 wherein the buffer comprises a delay buffer arranged to delay the MPEG transport data stream by an amount of time commensurate with an amount of time required by the MPEG encoder to encode the frames of the selected program with an on-screen display.

85-87. (canceled)

88. (previously presented) An MPEG on-screen display coder comprising:

a demultiplexer arranged to demultiplex frames of a selected video program from frames of a non-selected program in a transport stream;

an MPEG encoder arranged to receive the frames of the selected program and to process the frames of the selected program so as to encode frames with an on-screen display; and,

a multiplexer arranged to multiplex the encoded frames with the frames of the non-selected video program in the transport stream.

89. (new) The MPEG on-screen display coder of claim 88 wherein the encoded frames have a time base which is independent of the original frames of the selected program.

90. (new) The MPEG on-screen display coder of claim 88 wherein the encoded frames have a time base which is slaved to the original frames of the selected program.

91. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to calculate a video hold off time dependent upon a number of frames in a decoder buffer of the digital television receiver and to use the video hold off time so as to prevent overflow of the decoder buffer.

92. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to supply I frame markers, and wherein the multiplexer is controlled in response to the I frame markers so as to begin supplying encoded frames to the digital television receiver with one I frame and to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

93. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to supply a video I frame marker and an on-screen display I frame marker, wherein the multiplexer is controlled in response to the on-screen display I frame marker so as to begin supplying encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is controlled in response to the video I frame marker so as

to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

94. (new) The MPEG on-screen display coder of claim 93 wherein the MPEG encoder supplies the on-screen display I frame marker when the MPEG encoder generates an encoded I frame, and wherein the MPEG encoder signals the video I frame marker when an original I frame of the selected program is received.

95. (new) The MPEG on-screen display coder of claim 88 wherein the on-screen display is overlaid on a solid color background.

96. (new) The MPEG on-screen display coder of claim 88 wherein the on-screen display is overlaid on video.

97. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to pass unchanged I frames.

98. (new) The MPEG on-screen display coder of claim 97 wherein the MPEG encoder is arranged to encode a first P frame by predicting the first P frame from a preceding I frame with residuals in the predicted first P frame containing the on-screen display and with motion vectors set equal to zero, and wherein the MPEG encoder is arranged to encode subsequent P frames based upon the predicted first P frame with residuals and motion vectors set equal to zero.

99. (new) The MPEG on-screen display coder of claim 98 wherein the MPEG encoder is arranged to supply first and second I frame markers, wherein the multiplexer is controlled in response to the first I frame marker so as to begin supplying the encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is controlled in response to the second I frame marker so as to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

100. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to encode I frames with the on-screen display.

101. (new) The MPEG on-screen display coder of claim 100 wherein the MPEG encoder is arranged to encode subsequent P frames by prediction based upon the encoded I frames with residuals and motion vectors set equal to zero.

102. (new) The MPEG on-screen display coder of claim 101 wherein the MPEG encoder is arranged to supply first and second I frame markers, wherein the multiplexer is controlled in response to the first I frame marker so as to begin supplying the encoded frames to the digital television receiver with one I frame, and wherein the multiplexer is controlled in response to the second I frame marker so as to resume supplying the original frames of the selected program to the digital television receiver with another I frame.

103. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to generate an I frame having a solid color background and an on-screen display, and wherein the MPEG encoder generates a P frame predicted from the I frame with zero residual.

104. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to encode frames with the on-screen display by prediction with non-zero motion vectors in order to encode animated graphics.

105. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to pass a first I frame without modification, to predict subsequent P frames based upon the first I frame, to overlay the on-screen display on a second I frame, and to predict subsequent P frames based upon the second I frame.

106. (new) The MPEG on-screen display coder of claim 88 wherein the MPEG encoder is arranged to encode frames by mixing original video of the selected program in a window of reduced size with the on-screen display.

107. (new) The MPEG on-screen display coder of claim 88 wherein the multiplexer is arranged to add make-up packets to each encoded frame as necessary to

ensure that each encoded frame has as many transport packets as an original frame of the selected program.

108. (new) The MPEG on-screen display coder of claim 107 wherein the make-up packets are null packets.

109. (new) The MPEG on-screen display coder of claim 107 wherein the make-up packets are Program Map Table packets.

110. (new) The MPEG on-screen display coder of claim 88 further comprising a buffer, wherein the buffer is arranged to receive and buffer the transport stream, and wherein the buffer is arranged to delay the transport stream by an amount of time commensurate with an amount of time required by the MPEG encoder to encode the frames of the selected program with the on-screen display.

111. (new) The MPEG on-screen display coder of claim 62 wherein the MPEG encoder is arranged to encode frames of only the selected program with the on-screen display.